



Increased hurricane activity during the Early Toarcian extreme warmth

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Theoretical considerations led to the postulation that hurricane activity should increase on a warming planet. Finding physical proof for this relationship remains, however, a difficult task since no clear trend is yet emerging from records of present-day anthropogenic warming. The geological past offers the opportunity to test this hypothesis by assessing episodes of extreme warming events, such as the Toarcian Oceanic Anoxic Event (T-OAE, Early Jurassic, ca. 180 Ma). The T-OAE is characterized by a rapid 4-5°C global warming likely induced by the massive release of greenhouse gases into the atmosphere as a consequence of the activity of the Karoo-Ferrar large igneous province.

Within the western Tethyan realm (Morocco, Portugal, France, England, etc.), a systematic increase in the occurrence of storm-related deposits is observed within the shallow-water sediments deposited during the T-OAE, notably at its onset. Increased tempestite occurrences can be observed in both siliciclastic- and carbonate-dominated environments. In the Moroccan High Atlas, hummocky cross-stratification (HCS) occurs ubiquitous within the T-OAE, but is otherwise rare in this tide-dominated basin. Interestingly, the palaeolatitude of the High Atlas Basin (10°N during the Early Jurassic) rules out winter storms as the driving mechanism behind the formation of the HCS, and suggests therefore a significant increase of tropical hurricane activity associated with the Early Toarcian global warming.